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| APPLICATION NO.       | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------------|-------------|----------------------|---------------------|------------------|
| 10/537,188            | 06/02/2005  | Niall Gormley        | 2713-1-015PCT/US    | 1232             |
| 23565                 | 7590        | 10/18/2007           | EXAMINER            |                  |
| KLAUBER & JACKSON     |             |                      | SHAW, AMANDA MARIE  |                  |
| 411 HACKENSACK AVENUE |             |                      | ART UNIT            | PAPER NUMBER     |
| HACKENSACK, NJ 07601  |             |                      | 1634                |                  |
| MAIL DATE             |             | DELIVERY MODE        |                     |                  |
| 10/18/2007            |             | PAPER                |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                 |                |
|------------------------------|-----------------|----------------|
| <b>Office Action Summary</b> | Application No. | Applicant(s)   |
|                              | 10/537,188      | GORMLEY ET AL. |
| Examiner                     | Art Unit        |                |
| Amanda M. Shaw               | 1634            |                |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 06 August 2007.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-16 and 19-26 is/are pending in the application.
  - 4a) Of the above claim(s) 1-3, 6-16, and 19-26 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 4 and 5 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 02 June 2005 is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

**DETAILED ACTION**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 6, 2007 has been entered.

Claims 1-16, and 19-26 are currently pending. Claims 1-3, 6-16, and 19-26 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected subject matter, there being no allowable generic or linking claim 4 is currently amended. Therefore Claims 4-5 will be addressed herein.

***Withdrawn Rejections***

2. The rejections made under 35 USC 103(a) in sections 2 and 3 of the Office Action of April 9, 2007 are withdrawn in view of amendments made to the claims.

***Sequence Rules***

3. This application contains sequence disclosures that are encompassed by the definitions for nucleotide and/or amino acid sequences set forth in 37 CFR 1.821(a)(1) and (a)(2). However, this application fails to comply with the requirements of 37 CFR 1.821 through 1.825 for the reason(s) set forth below.

Both the specification and the figures contain nucleotide sequences comprising

ten or more nucleotides. Patent applications which contain disclosures of nucleotide sequences, in accordance with this definition are required to conform exclusively to the requirements of §§ 1.821 through 1.825. In the instant case the Applicants have not filed a paper sequence listing, a computer readable format of the sequence listing, or a statement that the content of the paper and computer readable sequences are the same. See MPEP2422.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following is a new rejection:

Claims 4-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 4-5 are indefinite over the recitation of the phrase "wherein the template and its complementary strand are covalently attached". This phrase is considered indefinite because it is unclear what is covalently attached. For example this could mean that the template and the complement are covalently attached to one in another in addition to base pairing or this could also mean that the complement is covalently attached to the hairpin by base pairing with the template which is covalently attached to the hairpin.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**The following is a new rejection:**

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lackey (US Patent 5652126) in view of Cheeseman (US Patent 5302509 Issued 1994).

Lackey teaches a single stranded template nucleic acid covalently attached to the 5' end of a self-complementary hairpin nucleic acid (Fig 4). In the instant case the template is covalently attached to the hairpin nucleic acid by a phosphodiester bond. Lackey teaches that the 3'-OH terminus of the hairpin nucleic acid serves as the

initiation site for synthesis via sequential addition of dNTPs in the 5' to 3' direction (Column 11, lines 15-32). Thus, Lackey teaches a method wherein the 3'-OH terminus of the hairpin nucleic acid serves as a primer to generate a nucleic acid strand complementary to the single stranded template strand. In the instant case the template and its complementary strand are considered covalently attached to the hairpin nucleic acid since the complementary strand is bound to the template by hydrogen bonds and the template is covalently bound to the hairpin by a phosphodiester linkage. Lackey further teaches a method wherein the formed primer extension product contains at least one cleavage site for a restriction enzyme, thus the formed extension product inherently contains at least one recognition site and one cleavage site for a nicking endonuclease (Column 11 lines 64-66). In the instant case the claim limitation wherein the recognition sequence is situated so that the cleavage site is before, at, or beyond the 3' end of the hairpin is not being given any weight since it encompasses cleavage sites that are at any possible location. Lackey also teaches that by contacting the hairpin-template-complement with the nicking endonuclease using conditions to disassociate the template and its complement, can result in a fully regenerated and reusable primer/template (Column 13, lines 27-32). Thus the method of Lackey recovers the single stranded template.

Lackey teaches extending the 3' end of the hairpin nucleic acid but does not teach sequencing the template as the 3' end of the hairpin is extended.

However Cheeseman teach a method for determining the sequence of nucleotides on a template strand of DNA during extension of the nucleic acid (Abstract).

Further Cheeseman teach that there are several benefits of sequencing while elongation is taking place. For instance Cheeseman states that (i) the rate limiting step of DNA identification is the rate of a polymerase reaction, (ii) the method is more sensitive therefore smaller quantities of DNA are needed, and (iii) the reagents required for sequencing only require a single mixture of bases rather than four separate preparations (Column 1, line 54 to Column 2 line 10).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Lackey by determining the nucleic acid sequence of the template nucleic acid as dNTPs are added to the 3' end of the hairpin which acts as a primer as suggested by Cheeseman. Methods of sequencing a nucleic acid in a PCR reaction while the elongation step is taking place were routinely used in the art at the time of the invention as demonstrated by Cheeseman and thus it would have been obvious to an ordinary artisan to have determined the sequence of the nucleic acid template this way particularly since Cheeseman teaches several advantages to this method such as: (i) the rate limiting step of DNA identification is the rate of a polymerase reaction, (ii) the method is more sensitive therefore smaller quantities of DNA are needed, and (iii) the reagents required for sequencing only require a single mixture of bases rather than four separate preparations. Further it would be obvious that after the template nucleic acid was recovered by the method of Lackey that it could be resequenced by the method of Cheeseman for the benefit of verifying the results of the first sequencing reaction.

The following is a new rejection:

7. Claims 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lackey (US Patent 5652126) in view of Cheeseman (US Patent 5302509 Issued 1994) as applied to claims 4 above, and in further view of Chernov (US 2004/0086866 Filed 10/2002).

The teachings of Lackey and Cheeseman are presented above.

The combined references do not teach a method wherein the hairpin probe is attached to a solid substrate.

However Chernov teaches that hairpin DNA probes attached to chips display higher rates of hybridization larger equilibrium amounts of captured targets in comparison with linear probes. Further hairpin-DNA-target complexes are thermodynamically more stable (Para 0013). Additionally Chernov teaches that hairpin probes attached to arrays can be extended (See Fig 4).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the methods of Lackey and Cheeseman by using hairpin probes which are attached to a solid substrate as suggested by Chernov et al because it was reported that hairpin probes attached to a chip display higher rates of hybridization and larger equilibrium amounts of captured targets in comparison with linear probes. Further hairpin-DNA-target complexes are thermodynamically more stable (Para 0013).

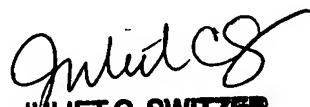
### ***Conclusion***

8. No Claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda M. Shaw whose telephone number is (571) 272-8668. The examiner can normally be reached on Mon-Fri 7:30 TO 4:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached at 571-272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Amanda M. Shaw  
Examiner  
Art Unit 1634

  
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